

CLAIMS

What is claimed is:

1. An electrochemical plating electrolyte solution, comprising:

an electrolyte bath solution; and

a polymer additive provided in said electrolyte bath solution, said polymer additive comprising polymers having an aromatic monomer and an aromatic amine monomer.

2. The electrochemical plating electrolyte solution of claim 1 wherein said aromatic monomer comprises a functional group selected from the group consisting of benzene and pyrrolidone.

3. The electrochemical plating electrolyte solution of claim 1 wherein said aromatic amine monomer comprises a functional group selected from the group consisting of imidazole and an imidazole derivative.

4. The electrochemical plating electrolyte solution of claim 3 wherein said aromatic monomer comprises a functional group selected from the group consisting of benzene and pyrrolidone.

5. The electrochemical plating electrolyte solution of claim 1 wherein each of said polymers has a chemical formula of $\text{CH}_3(\text{CH}_2\text{CHX})_m(\text{CH}_2\text{CHYCH}_2)_n\text{CH}_3$, where X is an aromatic functional group; Y is an aromatic amine functional group; and m and n are integers indicating numbers of said aromatic monomer and said aromatic amine monomer, respectively, in said each of said polymers.

6. The electrochemical plating electrolyte solution of claim 5 wherein said aromatic functional group comprises a functional group selected from the group consisting of benzene and pyrrolidone.

7. The electrochemical plating electrolyte solution of claim 5 wherein said aromatic amine functional group comprises a functional group selected from the group consisting of imidazole and an imidazole derivative.

8. The electrochemical plating electrolyte solution of claim 7 wherein said aromatic functional group comprises a functional group selected from the group consisting of benzene and pyrrolidone.

9. An electrochemical plating electrolyte solution, comprising:

an electrolyte bath solution; and

a polymer additive provided in said electrolyte bath solution, said polymer additive comprising polymers having an aromatic monomer and an aromatic amine monomer and a cationic charge density of from about 1 meq/g to about 6 meq/g.

10. The electrochemical plating electrolyte solution of claim 9 wherein said aromatic monomer comprises a functional group selected from the group consisting of benzene and pyrrolidone.

11. The electrochemical plating electrolyte solution of claim 9 wherein said aromatic amine monomer comprises a functional group selected from the group consisting of imidazole and an imidazole derivative.

12. The electrochemical plating electrolyte solution of claim 9 wherein each of said polymers has a chemical formula of $\text{CH}_3(\text{CH}_2\text{CHX})_m(\text{CH}_2\text{CHYCH}_2)_n\text{CH}_3$, where X is an aromatic functional group; Y is an aromatic amine functional group; and m and n are integers indicating numbers of said aromatic monomer and said amine monomer, respectively, in said each of said polymers.

13. The electrochemical plating electrolyte solution of claim 9 wherein each of said polymers has a molecular weight of from about 2,000 to about 400,000.

14. The electroplating electrolyte solution of claim 13 wherein said aromatic monomer comprises a functional group selected from the group consisting of benzene and pyrrolidone.

15. The electroplating electrolyte solution of claim 13 wherein said aromatic amine monomer comprises a functional group selected from the group consisting of imidazole and an imidazole derivative.

16. The electroplating electrolyte solution of claim 13 wherein each of said polymers has a chemical formula of $\text{CH}_3(\text{CH}_2\text{CHX})_m(\text{CH}_2\text{CHYCH}_2)_n\text{CH}_3$, where X is an aromatic functional group; Y is an aromatic amine functional group; and m and n are integers indicating numbers of said aromatic monomer and said aromatic amine monomer, respectively, in said each of said polymers.

17. A method of electroplating a metal on an electroplating surface, comprising the steps of:

providing an electrolyte bath solution;

mixing a polymer additive with said electrolyte bath solution, said polymer additive comprising polymers having an aromatic monomer and an aromatic amine monomer;

immersing said electroplating surface in said electrolyte bath solution; and

electroplating said metal onto said electroplating surface.

18. The method of claim 17 wherein said aromatic monomer comprises a functional group selected from the group consisting of benzene and pyrrolidone and said aromatic amine monomer comprises a functional group selected from the group consisting of imidazole and an imidazole derivative.

19. The method of claim 17 wherein each of said polymers has a chemical formula of $\text{CH}_3(\text{CH}_2\text{CHX})_m(\text{CH}_2\text{CHYCH}_2)_n\text{CH}_3$, where X is an aromatic functional group; Y is an aromatic amine functional group; and m and n are integers indicating numbers of said aromatic monomer and said amine monomer, respectively, in said each of said polymers.

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20. The method of claim 17 wherein each of said polymers has a molecular weight of from about 2,000 to about 400,000 and a cationic charge density of from about 1 meq/g to about 6 meq/g.